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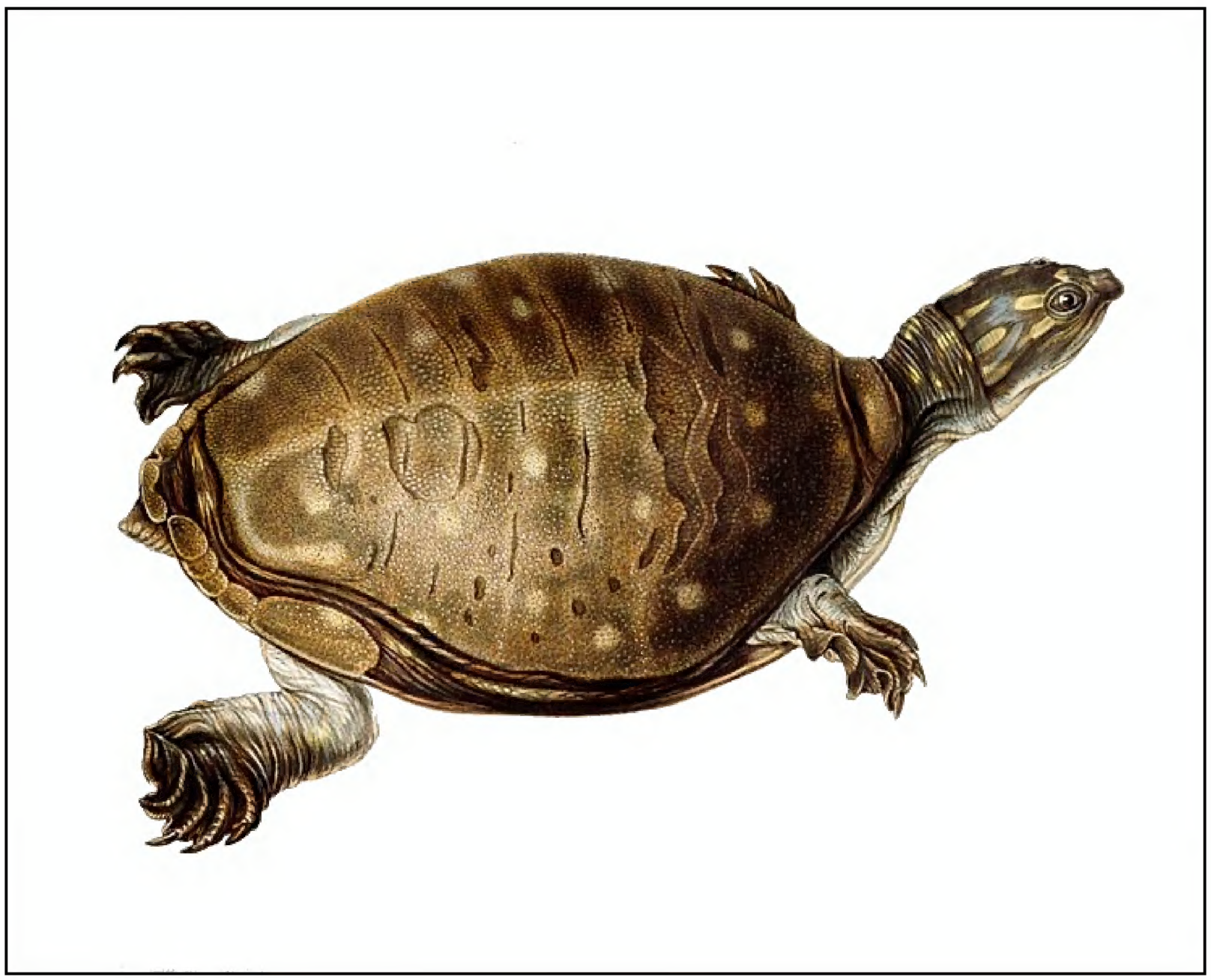

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Notes on the Herpetofauna of Western Mexico 14: Herpetofauna of a Dry Oak Forest in a Portion of Sierra del Cuale on the Pacific Coast of Jalisco

Erika Sugey García Mata [1], Daniel Cruz-Sáenz [1]*, Ariosto Rafael Romero Guzmán [2] and David Lazcano [3]

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Abstract

Twenty-four months of field sampling in a diverse and rich dry oak forest has resulted in a list of 33 species of amphibians and reptiles present in a portion of Sierra del Cuale on the Pacific Coast of Jalisco, Mexico.

Resumen

Se realizó el muestreo de herpetofauna en una localidad de la Sierra del Cuale con una vegetación de bosque de encino, en base a estos muestreo presentamos el listado actual de esta localidad compuesto por 33 especies de anfibios y reptiles.

Introduction

The Sierra Cuale is a mountainous part of the municipalities of Puerto Vallarta, Mascota, Talpa and Cabo Corrientes in the state of Jalisco, Mexico. The Comisión Nacional para el Uso y Conservación de la Biodiversidad and the Comisión Nacional de Áreas Naturales Protegidas consider it as a priority region for conservation, because of its extraordinary richness of species (Amparán-Salido et al., 2011).

It is estimated that 52% of the amphibians, 40% of the reptiles and 36% of certain mammals here are endemic to Mexico. Demonstrating the enormous biological wealth of the region, there are registered 2046 species of plants (likely to be over 4000), 72 species of mammals, birds more than 314, and 111 of amphibians and reptiles. More than 12 plant communities are established (Amparán-Salido et al., 2011).

It is important to mention the degree of deterioration that is occurring in the jungles and forests of Pacific Coast of Mexico due to the growth of urban areas and the large number of tourist developments.

The dry forests of the Mexican Pacific Coast have been well studied (see among others García and Ceballos, 1994; Ramírez-Bautista, 1994; Ceballos et al., 2010). However, other types of vegetation and temperate forests that occur in the area have been little studied. Also, some studies of the herpetofauna of the mangrove vegetation have been made within the same municipality in Puerto Vallarta (Cruz-Saenz et al., 2013; Penilla-Juarez et al., 2013).

Much is known about the tropical deciduous forests and rainforests but there is a lack of information about temperate forests in Jalisco State (Cruz-Sáenz et al., 2009). Although rainforests and deciduous forests are richer and more diverse than temperate forests, is important to have information about the latter, to carry out sustainable management.

Materials and methods

We sampled amphibians and reptiles using 13 band transects 500 m in length and 10 m wide. The sampling sites were distributed so as to represent the different vegetation types.

Study site

The study site is a portion of Sierra del Cuale, which is a section of Sierra Madre del Sur. Is in the municipality of Puerto Vallarta, Jalisco. Vegetation is predominately pine-oak forest. The coordinates of the site are 20°31'36.0"N, 105°11'42.7"W; maximum elevation is 2,700 masl.

Figure 1. Location of study site in Puerto Vallarta, Jalisco. Star icon shows the sample site.

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Table 1. Amphibians and reptiles of Sierra del Cuale, Puerto Vallarta, Jalisco. **Endemism**: EM = endemic to Mexico; NE = not endemic. **NOM** = protection status under NOM-ECOL-059-2010 (SEMARNAT, 2010): Pr = Protección Especial (Special Protection); A = Amenazada (Threatened). **IUCN** = protection status according to the International Union for Conservation of Nature (IUCN, 2014): LC = least concern; VU = vulnerable; EN = endangered; DD = data deficient. **EVS** = Environmental Vulnerability Score sensu Wilson et al. (2013a, b): low risk (3–9); medium risk (10–13); high risk (14–20). **Vegetation**: POF = pine-oak forest; RV = Riparian Vegetation. Nomenclature from Smith et al. (2002), Goyenechea and Flores-Villela (2006), Wilson and Townsend (2007), Liner and Casas-Andreu (2008).

	Order	Family	Species	Endemism	NOM	IUCN	EVS	Vegetation
Amphibia	Anura	Bufonidae	*Incilius occidentalis*	EM	-	LC	11	POF
			Rhinella marina	NE	-	LC	3	RV
		Hylidae	*Hyla arenicolor*	NE	-	LC	7	RV
			Exerodonta smaragdina	EM	Pr	LC	12	RV
		Craugastoridae	*Craugastor hobartsmithi*	EM	-	EN	15	POF
		Eleutherodactylidae	*Syrrhophus nitidus*	EM	-	LC	12	POF
			Eleutherodactylus pallidus	EM	Pr	DD	17	POF
		Ranidae	*Lithobates pustulosus*	EM	Pr	LC	9	POF
Reptilia	Squamata	Helodermatidae	*Heloderma horridum*	NE	A	LC	11	POF
		Phyllodactylidae	*Phyllodactylus tuberculosus*	NE	-	NE	8	POF, RV
		Phrynosomatidae	*Sceloporus asper*	EM	Pr	LC	14	POF
			Sceloporus bulleri	EM	-	LC	15	POF
			Sceloporus heterolepis	EM	-	LC	14	RV
			Sceloporus horridus	EM	-	LC	11	POF, RV
			Sceloporus scalaris	NE	-	LC	12	POF
			Sceloporus spinosus	EM	-	LC	12	POF, RV
			Sceloporus utiformis	EM	-	LC	15	POF,RV
			Urosaurus bicarinatus	EM	-	LC	12	RV
		Dactyloidae	*Anolis nebulosus*	EM	-	LC	13	POF, RV
		Teiidae	*Ameiva undulata*	NE	-	NE		POF, RV
			Aspidoscelis costata	EM	Pr	LC	11	RV
			Aspidoscelis lineattissima	EM	Pr	LC	14	POF
		Scincidae	*Plestiodon brevirostris*	EM	-	LC	11	POF
		Boidae	*Boa constrictor*	NE	A	NE	10	RV
		Xenodontidae	*Manolepis putnami*	EM	-	LC	13	POF
		Colubridae	*Drymarchon melanurus*	NE	-	LC	6	POF, RV
			Leptodeira splendida	EM	-	LC	14	RV
			Leptophis diplotropis	EM	A	LC	14	POF
			Oxybelis aeneus	NE	-	NE	5	POF
		Natricidae	*Storeria storerioides*	EM	-	LC	11	POF
			Thamnophis cyrtopsis	NE	A	LC	7	POF, RV
		Typhlopidae	*Ramphotyphlops braminus*	NE	-	-	-	POF
		Viperidae	*Crotalus basiliscus*	EM	Pr	LC	16	POF, RV

The vegetation of the site is characterized by various species of conifers and oaks, including: *Juniperus jaliscana*, *Pinus maximinoi*, *P. oocarpa*, *Quercus aristata*, *Q. magnolifolia* and *Q. elliptica*. According to the latest estimate, the number of species of oaks in the world is between 400 and 500 (Nixon et al., 1997; Manos et al., 1999). There is a great diversity of oaks in Mexico (Zavala, 1990; Bonfil, 1993; Nixon, 1993), with an estimated 161 species according to Valencia-Ávalos (2004).

Results

After 24 months of fieldwork 33 species of amphibians and reptiles were registered; eight of amphibians and 25 of reptiles.

The eight amphibian species are in eight genera, distributed in five families of the order Anura. Of these eight species, six are endemic to Mexico and three protected by environmental Mexican laws (NOM-SEMARNAT- 059-2010) (see Table 1).

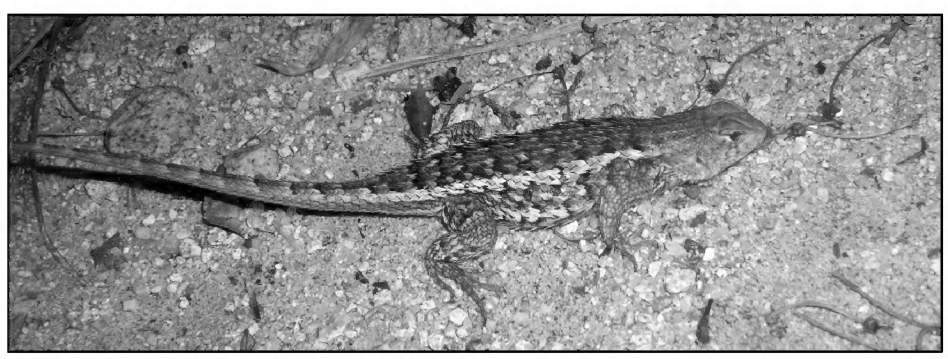
The 25 reptile species are in 18 genera, distributed in 12

General view of the study site. Photograph by Ariosto Rafael Romero Guzmán.

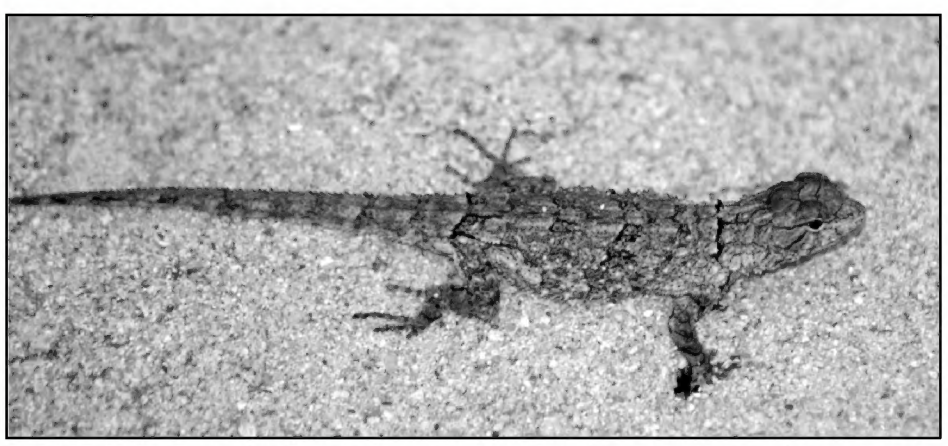
Emerald treefrog (*Exerodonta smaradigna*). Photograph by E. Sugey García Mata.

Vine snake (*Oxybelis aeneus*). Photograph by E. Sugey García Mata.

Beaded lizard (*Heloderma horridum*). Photograph by Ariosto Rafael Romero Guzmán.



Rough lizard (*Sceloporus horridus*). Photograph by E. Sugey García Mata.



Tropical tree lizard (*Urosaurus bicarinatus*). Photograph by E. Sugey García Mata.

White-striped frog (*Lithobates pustulosus*). Photograph by E. Sugey García Mata.

Splendid cat-eyed snake (*Leptodeira splendida*). Photograph by E. Sugey García Mata.

Table 2. Comparative of species richness of some temperate sites in Jalisco state. **Vegetation**: POF = pine-oak forest; RV = Riparian Vegetation; CF = Cloud forest; MF = Mangrove forest; GF = Gallery forest; OF = Oak forest; TDF = Tropical deciduous forest.

Study site	Amphibians	Reptiles	Vegetation	Reference
Parque Ecoturistico El Tecolote	5	14	POF	Muñoz-Nolasco et al., 2015
Biosphere reserve, Sierra de Manantlán	6	18	POF, CF	Orozco-Uribe, 2009
Natural Protected Area, Estero el Salado	5	21	MF	Cruz-Sáenz et al., 2013
Sierra del Cuale	8	25	POF, RV	Present study
Huaxtla, Zapopan, Jalisco	9	27	OF	Cruz-Sáenz et al., 2011
Natural Protected Area, Bosque La Primavera	17	39	GF, OF, TDF	Reyna-Bustos et al., 2007
Natural Protected Area, Sierra de Quila	23	45	GF, POF, OF	Santiago-Peréz et al., 2013

families of the order Squamata. Sixteen species are endemic to Mexico and eight protected by environmental Mexican laws (NOM-SEMARNAT- 059-2010) (see Table 1).

The majority of records were made in pine-oak forest (POF). Five of eight amphibian species were recorded from pine-oak forest and three from riparian vegetation. Of the 25 reptile species, 20 were recorded from pine-oak forest and 14 from riparian vegetation (some were recorded from both vegetation types).

Discussion

Despite the low annual rainfall this site in Sierra del Cuale has significant species richness. This can be seen from Table 2, in which we compare different sites of temperate forest in Jalisco state.

Huaxtla is a site with oak forest like study site this two site regardless of distance they are more alike in species richness (Table 2).

There is an effort to convert Sierra del Cuale to a natural protected area. That effort is the result of a previous justificative study (Amparán Salido et al., 2011), a legal document to include this place under environmental protection laws. That study registered 12 amphibian species and 31 reptiles, but it included all of the Sierra el Cuale and some species were included based only on literature records. The present study found no evidence of some of these species in the site, and registered only eight amphibian species and 25 reptiles.

Because the mountains around Puerto Vallarta are still almost pristine, preserving this site represents an important opportunity for conservation of oak and tropical deciduous forest ecosystems.

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Book Review: *Peterson Field Guide to Reptiles and Amphibians of Eastern and Central North America, Fourth Edition* by Robert Powell, Roger Conant and Joseph T. Collins. 2016. 512 pp. Houghton Mifflin Harcourt Publishing. ISBN: 978-0-544-12997-9. Softcover $21.00

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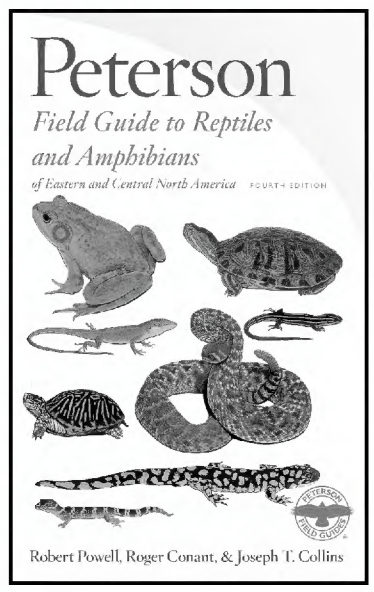
In fairness to the reader, I must begin this review with a confession: I'm a big fan of field guides. I like to identify what I encounter when afield and, as a visually-oriented learner, I find the heavy reliance on illustrations in field guides particularly appealing. Further, I marvel at an artist's ability to render realistic drawings or paintings of lifeforms simply using pencil, pen or paint.



As a child, I started with Golden guides, those small, 4 × 6" books filled with color renderings of Nature's wonders, ranging from those found on Earth to those visible in the Heavens. The drawback to the little Golden animal and plant identification guides is their limited scope and their expressed focus on common or most-often-encountered species. What happens when one encounters an uncommon species not included within the guide? The result can be misidentification as was amusingly recounted in Ronn Altig's enjoyable book, *Toads Are Nice People*.

Most Peterson field guides provide more comprehensive coverage than the little Golden guides by including every species within the geographic range covered by the guide. Exceptions include certain plant and invertebrate groups that are too speciose to permit comprehensive coverage in a regional guide. Accurate identification of species in such large groups, even at the state level, requires capacious tomes. Thankfully, the two vertebrate groups of principal interest to readers of the *Bulletin*—amphibians and reptiles—can be covered comprehensively at the geographic level of a Peterson field guide.

My first Peterson guide, entitled *A Field Guide to Reptiles and Amphibians of the United States and Canada East of the 100th Meridian*, is a well-worn, hardback, fifth printing of the first edition, copyrighted in 1958 when I was just a toddler. I don't recall when I got it, but it was certainly sometime during my youth. Later in life I acquired the second and third editions of the *Guide*. Naturally, my first copy has immeasurable sentimental value. My second edition, however, also has a special place in my heart because Roger Conant inscribed these words into it when I met him at the joint Herpetologists' League/SSAR meeting at Tulane University in New Orleans: "Inscribed for John Palis with the best wishes of Roger Conant." It's not often in life one has the pleasure of meeting his or her hero, but such was my exceptionally good fortune in August 1990.

The first question that comes to the forefront when a new edition of a book is published is whether it differs sufficiently from the previous edition to warrant purchase. To assist with your decision, I will focus this review on comparing the new edition with the third edition of the *Guide*. Please note that I refer to the third edition published in 1991, not the "revised and expanded" version published in 1998. I did not acquire the "revised and expanded" edition because the text was unchanged from the original third edition.

The first notable change with publication of the fourth edition is authorship. Roger Conant was, as perhaps all readers of the *Bulletin* know, the original author of the Peterson reptile and amphibian field guide and sole author of the first two editions. The third edition was co-authored with Joseph Collins. Both gentlemen have passed away, Roger Conant in 2003 and Joseph Collins in 2012 (Adler, 2004, 2012), so an additional author—Robert Powell—was recruited to update the field guide. Dr. Powell teaches biology at Avila University, Kansas City, Missouri, and specializes in the herpetofauna of the West Indies. He previously co-authored *Key to Herpetofauna of the Continental United States and Canada*, uniquely qualifying him for the task of bringing the fourth edition of the Peterson field guide up to date. The decision to list Powell as lead author, however, is unexpected. After all, the bulk of the fourth edition is comprised of text originally penned by Roger Conant. I don't know what thought process resulted in the decision to bump Conant to second author, but I would have preferred that he retained primary authorship.

Physically (height, width, thickness, and weight), the fourth edition looks and feels much like the third. Open it up, however, and one immediately notices a change in paper (from mat-finish to glossy) and typeface (different font and lighter print). The range maps have also changed, both in location and color. Rather than being assembled together near the end of the book, range maps are now scattered throughout the book and, typically, occur on or near the same page as the corresponding species account. In previous editions, geographic ranges of closely-related taxa that were plotted on the same black and white range map were distinguished from each other by various forms of shading, stippling, cross-hatching, etc. Ranges of different taxa are now shown by the use of different colors. The location of the illustration plates has also been rearranged. They are no longer assembled all together in the center of the book, but are now scattered throughout, organized by order. For example, all the turtle plates are now grouped together at the beginning of the turtle section. Perhaps it's a condition of my aging eyes, but I find the sheen of the glossy paper rather annoying and the faint print exhausting to read. And, although I do prefer the new arrangement of range maps, I do miss the ability to

peruse maps of all taxa clustered together.

As a general rule, the use of color to exhibit a taxon's range works well. Different colors are especially useful to distinguish the distribution of a limited-range species when completely encompassed by the range of a wide-ranging species. For example, the restricted range of the Shenandoah Mountain Salamander depicted in gray is readily distinguished from the surrounding range of the Valley and Ridge Salamander depicted in red. However, in cases where numerous colors are required to distinguish the ranges of multiple species mapped together, the colors used are sometimes difficult to distinguish. The range map of the 13 species of slimy salamanders is a good example; several colors are difficult to differentiate.

The first and foremost mission of any field guide is to facilitate the identification of a specimen at hand, and Peterson field guides do an impressive job. The grouping of similar-appearing animals on the same photographic plate is a hallmark of every edition of the Peterson reptile and amphibian guide and is an outstanding identification tool. Unfortunately, rather than amending the plates with images of species newly added to the fourth edition, these species are illustrated with photographs scattered throughout the text. In some cases, this may render correct identification less likely. For example, should a person encounter a Patch-nosed Salamander (a recently discovered species described by Camp et al., 2009), he/she may be more likely to be misidentify it as a Two-lined Salamander than correctly identify it as a Patch-nosed Salamander. Identification of a species using the *Guide* starts with examination of the illustration plates. Small, slender, yellowish salamanders having a pair of dark dorsolateral stripes are illustrated on Plate 3. Patch-nosed Salamanders are not included on Plate 3 with similar-appearing Two-lined Salamanders. Further, there is no mention of Patch-nosed Salamanders in the Similar Species section of any Two-lined Salamander account. So, unless one flips through the entire salamander section of the book, a Patch-nosed Salamander could be misidentified as a Two-lined Salamander.

Because newly-established, non-native lizard species are so numerous, merging their illustrations on plates would have greatly enhanced the usability of the *Guide*. Using the fourth edition of the *Guide*, a person attempting to identify a lizard may have to leaf through the entire 87-page lizard section to match an image with a specimen. And, in the case of the common house gecko, the reader will have to search the bulk of the book to find the photograph that appears on page 448. This image is separated from the corresponding species account by an incredible 187 pages! I certainly hope the publisher will consider improving the usefulness of the next edition by updating the illustration plates.

Several fourth edition plate images are arranged differently from the third edition, some for better, some not. I like, for example, the decision to place all toads together on a single plate. This should facilitate the identification of a toad in-hand. Other new arrangements, however, may render species identification more challenging. Consider the often-confused Mudpuppy and Hellbender. Previously, these two taxa were illustrated on the same plate allowing for direct comparison. Now, images of Hellbenders are shown on Plate 2, separated from images of Mudpuppies shown on Plate 6, by seven pages. In another example (there are many), Painted Turtles and Red-eared Sliders, two similar-looking species that often bask together and previously were illustrated on the same plate, are now illustrated on different plates, separated by five pages. Illustration rearrangements have, in some cases, also separated closely related taxa on different plates. For example, American Water Frogs (formally "True Frogs"), previously all illustrated on one plate, are now illustrated on two adjacent plates. Those of us accustomed to previous editions of the *Guide* will require time to acclimate to these new arrangements.

Changes have also been made to the text, principally in the form of deletions. Gone are the sections on catching and maintaining amphibians and reptiles in captivity. These were omitted, as explained in the Introduction, "to accommodate accounts of newly discovered or described species" (the number of species covered has increased from 379 to 501; mostly due to the establishment of non-native species and taxonomic rearrangements based on molecular techniques). Considerable script was also deleted from species accounts to save space (as was mourned by Dr. Powell in the Acknowledgments section). Personally, I would rather have seen some of the deleted text preserved and extraneous photographs left out. Space lost to full-page photographs and supplementary photographs of species already depicted on plates could have been used to retain some original language.

In the Introduction, it is stated in bold text that an animal that has been kept in captivity, "even for short periods" should never be released. This statement is followed by "This is especially true of non-native species." I wholeheartedly agree that non-native species should never, under any circumstance, be released. I am also aware of the potential to introduce disease into the environment by the release of a captive animal. I do believe, however, that under certain circumstances, a captive, healthy, native animal can be released back to its place of capture without excessive risk to the environment. The scenario I envision is one where an animal is captured locally, housed separately from other captive animals—should there be any—cared for properly, and then returned to its place of capture, if desired. Kept in isolation, a healthy, temporary captive is highly unlikely to contract a disease that could be introduced into the environment upon its release (Mendelson et al., 2009). I believe we have to balance biosecurity with the benefits of ownership (even temporary) of native amphibians and reptiles. Keeping a pet promotes empathy for animals and keeping a native species, in particular, increases concern for local species and local environments. I am proud that my son, Forrest, who has been driving for several years now, actively avoids snakes and turtles on roads, and will sometimes stop to move them off the road. In addition to modeling my driving habits, I believe his commendable behavior has also been influenced by exposure to temporarily-captive native amphibians and reptiles during his formative years.

The general format of each species account follows previous editions by providing common and scientific name, typical and record lengths, physical description highlighting unique characteristics, and the following sections: Similar Species, Habitat, and Range. In some accounts, additional sections such as Remarks (oftentimes related to taxonomy), Voice (description of anuran vocalizations), Natural Range (for non-native species), and Conservation (for species of conservation concern) are provided. Non-native species are immediately recognizable by "non-native" in red-text following the species' name. In addition to written descriptions of anuran calls, the How to Use This

Guide section directs the reader to several webpages that provide anuran-call recordings. I particularly like the recordings at the United States Geological Survey (USGS) Patuxent Wildlife Research Center (PWRC) website.

One of the biggest improvements to the *Guide* is the taxonomic rearrangement where amphibians precede reptiles. Hopefully, the next edition will reflect this change in the book title as well. I also like the addition of color-coding on the bottom edge of each page corresponding to different orders. For example, green is used indicate frog plates and text, whereas blue is used for snakes. Color coding facilitates rapid location of each order. Further, the outside edge of each plate page is also color-coded so that the location of plates can be readily differentiated from text without opening the book.

Tom Johnson's excellent drawings of tadpoles of a limited number of anurans have also been jettisoned from the fourth edition of the *Guide*. Because larval amphibians are often more likely to be encountered than adults, the inclusion of larvae can greatly benefit the field biologist. However, to be really useful, all species would need to be included, not just a limited number. So, for that reason I don't particularly miss the Sampling of Tadpoles section. In the introductory text to the anuran section, the reader interested in larval amphibians is encouraged to refer to *Handbook of Larval Amphibians of the United States and Canada* by Ronn Altig and Roy McDiarmid, and/or to visit the USGS PWRC website.

The newly-added drawings of the heads of map turtles and black-headed, flat-headed, and crowned snakes by Errol Hooper, Jr., will greatly enhance the reader's ability to correctly identify species in these groups. The snakes are illustrated in one figure, but the turtles appear in two figures, separated by seven pages. I think they would have been better illustrated in one figure.

Given the ever-increasing usage of electronic data sources, especially by younger people, the future of print books, such as Peterson Field Guides, is uncertain. For example, I recently met a young couple who were examining a snake on Snake Road in southern Illinois. They had correctly identified it as a Red-bellied Snake using their smartphone. To stay competitive, I think field guides will need unique characteristics that set them apart from smartphones. In the case of the Peterson amphibian and reptile guide, the grouping of similar-looking species on the same plate is one such unique character. Therefore, illustrating newly-added species on plates will go a long way in keeping the *Guide* in demand. Retaining, or even expounding upon informative text such as that deleted from previous editions, will also keep the *Guide* relevant. Perhaps it's time to consider separating amphibians and reptiles into two separate field guides to permit the inclusion of more text, particularly relating to the natural history of each species.

Having spent the last quarter century of my life surveying for and studying flatwoods salamanders, I closely examined the flatwoods salamander accounts for this review. In the third edition of the *Guide* there was only one species of flatwoods salamander; now there are two, Frosted Flatwoods Salamanders and Reticulated Flatwoods Salamanders (Pauly et al., 2007). Regrettably, both species accounts in the fourth edition contain errors. For example, the maximum total length of Reticulated Flatwoods Salamanders per the *Guide* is four inches; I have held animals in my hands that exceeded five inches in length. The *Guide* asserts that Frosted Flatwoods Salamanders have been "extirpated" from South Carolina. In my opinion, it is premature and unwise to declare Frosted Flatwood Salamanders extirpated from South Carolina. Sampling effort for flatwoods salamanders in South Carolina has been sporadic and insufficient, and some of the best potential habitat occurs on privately-owned land where access has been denied. I captured Frosted Flatwoods Salamander larvae in South Carolina as recently as 2010 and I anticipate encountering them again during a future sampling expedition.

Now, back to the original question: Does the fourth edition of the *Guide* differ sufficiently from the third edition to warrant purchase? Absolutely! The new edition includes 122 species not included in the previous version, reflects many recent changes in taxonomy (at the species level and above), and directs the reader to useful websites and additional printed sources of information published since the third edition. Although a few tweaks may improve it further, the *Guide* is still the best amphibian and reptile field identification tool available. Frankly, it's difficult to imagine life without it.

Acknowledgments

Mike Dloogatch offered me the opportunity to review the new edition of the *Guide*.

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What You Missed at the May Meeting

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I doubt that any one of you wants any species to go extinct. I suspect that if you're reading this you're aware of the threats to amphibians and reptiles. I hope that you practice good conservation in your daily life and certainly in your field herping. You may give generously to various conservation groups. Since you're reading this, you certainly contribute with your dues and volunteer efforts towards the many outreach programs and grants that are offered by the Chicago Herpetological Society. I try to do all those things, succeeding in some areas better than others (I'd really like ticks to go extinct), but I admit to occasionally falling back on the shoulder-shrugging routine accompanied by a "What can I do about it?" upon encountering many of life's problems. That's not meant to be an excuse, and definitely not meant to be a critique of those of us who know we can't solve all problems, but it still gives me a guilty twinge when I come across a real performer—a person who sees a problem and works on solving it. Such people do more than preach or pay, they act. Our May speaker is one.

Chip Cochran. Photograph by Dick Buchholz.

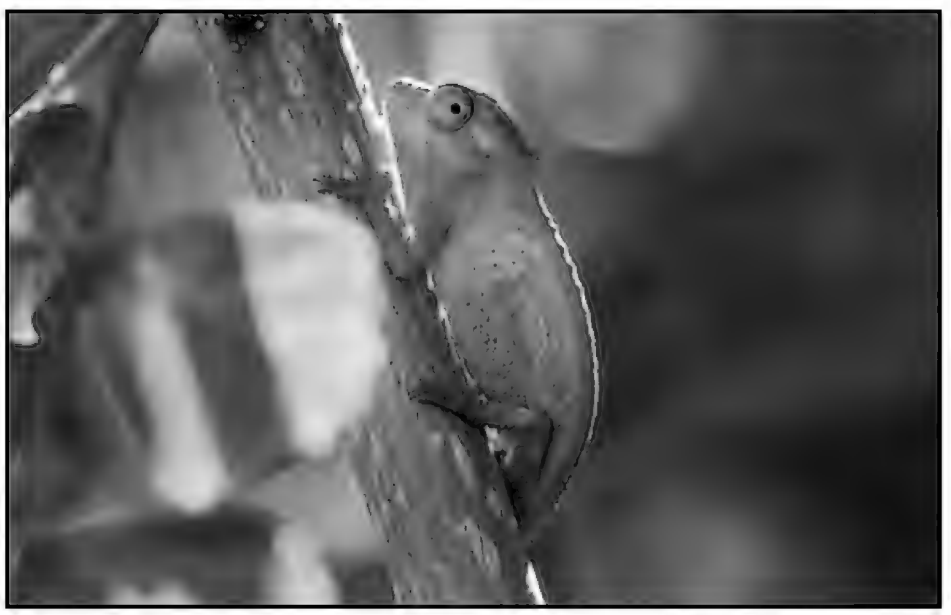
Chip Cochran is no stranger to the CHS, but I had never met him. For some reason I missed him when he first gave a talk to our group back in 2012, but he has received a grant, given a talk, and field-herped with CHS members. The anticipation of some of our members increased my anticipation, and I was certainly not disappointed when I finally had the privilege of meeting him. He is confident and modest and interesting to talk with and very much a field herper. From his bio:

> Chip Cochran is a PhD candidate in Dr. William K. Hayes lab at Loma Linda University where he is studying morphological, dietary, and venom composition differences among populations of southwestern speckled rattlesnakes (*Crotalus pyrrhus*). He received his BS from The University of Arizona in 2006 where he majored in Ecology and Evolutionary Biology. During his time at the University of Arizona he worked in Matt Goode's lab primarily radio tracking Tiger rattlesnakes (*C. tigris*) for a project investigating the effects of golf courses on Tucson herpetofauna. His research interests include: venomous animals and their venoms, evolution, conservation, and ecology.

What he talked about was an organization he and a few partners have started called Herpetological Conservation International (HCI), and specifically their first venture, dubbed Project Pondo. HCI was created in 2015 as a 501(c)3 focusing primarily on the conservation of reptile and amphibians. No board members receive a salary. Chip gave us justifications for forming HCI. You should already be aware of many of them, but a refresher is always nice. He talked of the huge threats to all species. Of the 76,000 species that have been assessed, nearly 30% are considered vulnerable or worse. He presented some economic justifications for conserving some species, and pointed out that 20% of assessed reptiles are threatened with extinction and 20% have not even been assessed. The threats are standard: overgrazing, agriculture, wood collection, invasive plants and urbanization.

While you have to admire the folks who are actually tackling these problems, it's too easy to say we'll do something and then find out that the task is much harder than planned and quickly becomes unachievable, so Chip laid out the careful planning and realistic goals that HCI has pursued. Helped along by questions from our knowledgeable and maybe a bit cynical audience, Chip explained that they chose the Pondo dwarf chameleon (*Bradypodion caffer*) because it is one of the 17 species of dwarf chameleons that has been assessed as endangered, it has limited distribution, suitable habitat is estimated at only 45 square kilometers (17.4 square miles) and the extent of the species' occurrence is less than 5000 square kilometers (1930 square miles). HCI recognizes that they are small with limited funding, so they want to start with a feasible project. Habitat for the chameleon is available, can be purchased relatively cheaply, and is bordered by opportunities for expansion. He believes that the local populace can be encouraged to support the project by offering well-paying jobs in an area of extreme poverty. As in all projects of this nature, protecting the habitat for the lizards protects the habitat for many other threatened species of both plants and animals that rely on that habitat, thus offering opportunities for funding from organizations that support flora and fauna besides reptiles. He explained the three phases of the project that include purchasing the land, doing baseline surveys of the habitat and inhabitants, and assuring proper maintenance and possibilities of expansion.

So, will they succeed? I certainly don't know, but Chip went


The beneficiary of HCI efforts, a Pondo dwarf chameleon (*Bradypodion caffer*). Photograph by Anton Roberts.

Typical habitat for the Pondo dwarf chameleon can be purchased relatively cheaply. Photographs by Anton Roberts.

into much greater detail in his talks than I present here. He answered all the questions and showed that they have considered all the obstacles that the audience could present and have plans to deal with them. They have some pretty secure sources of funding and seem to be properly attacking the issues with a pragmatism that should give them a really good shot at making this project a success, and if this project succeeds, I know they will grow HCI. From little acorns . . .

Chip wasn't finished with his presentation. He briefly brought us up to speed on his graduate project, partially funded by your society. Chip is studying venom variations in populations of southwestern speckled rattlesnakes (*Crotalus pyrrhus*).

His interest in that snake was sparked by an unfortunate envenomation of a friend who did not respond well to the standard treatments. The friend recovered, but Chip's interest in the snake was launched. His proposal was to collect venom, tissue, and fecal samples from across the speckled rattlesnake's range, look at the venom differences and determine whether phylogeny, diet, or geographic distance best correlates with those differences. He also plans to investigate how well CroFab neutralizes the toxins in the various populations. To date he has assessed 180 snakes from 23 localities across Southwestern U.S. He is beginning to analyze the protein fractions in the venom samples (nearly all of his samples were collected in the field) and gave us a brief summary of that procedure. After listening to his explanations several times (I always tape the speakers I write about), I am still far away from being able to cogently explain the process, which says much more about my limits than Chip's abilities as a speaker. As often, I was impressed by the questions asked and the answers given.

So that's what you missed if you missed the May meeting. Of course, you also missed being able to chat over food and drink with Chip, which is a pleasurable experience in itself. He's pragmatic, companionable, intelligent, and a driven field herper. I consider myself lucky to have finally met him. I hope it's not too long before I get to chat with him again. I'll pick up the tab.

You can follow Chip Cochran on Twitter and Facebook. Herpetological Conservation International has a web site: herpconservation.org and a Facebook page.

Speckled rattlesnakes display considerable variation in color and pattern. Photographs by Chip Cochran.

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Godzilla's Brood of Climbing Fools

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At 2210 hours on 28 June 2014, the second entry on page 82 of the three-ring binder that encapsulates all activities of the Suizo Mountain Project for 2014 has this to say: "Herp #: Cm24 female, Site #1. New snake—pregnant female coiled loosely atop 70 cm tall man-made wall that corrals ~3 m × 1.25 m low-lying midden made of cactus debris under 2 m tall rock overhang under canopy of mesquite. North Side of Tim Canyon below Cm18. Ambient temp Centigrade: 29, Health: Pregnant." These words were written by Marty Feldner, and followed by some in-situ photography (Figure 1), after which John Slone and Marty bagged the snake.

Meanwhile, this author was over 500 meters away, radio-tracking other rattlesnakes that were located on Iron Mine Hill. The arrangement made with Slone and Feldner was that I would pick them up at 2330 hours at a predetermined rendezvous point. As I drove my pickup truck toward the arranged meeting place, my eyes were bedazzled by the erratic sweeping of flashlights and headlamps that were rapidly descending the steep ridge that composed the south flank of the Suizo Mountains. With the velvety black starlit sky barely revealing the silhouette of the massive ridge above me, their bright headlamps brought the notion of descending aliens to an over-tired mind. We might say descending angels, but Slone and Feldner should never be compared to anything so pure. Upon noting that I could get the vehicle closer to them by driving down Suizo Wash, I did just that. Eventually, the two "aliens" picked their way through the harsh hackberry and catclaw acacia that lined the side of the wash, and were approaching the truck. My greeting to them was curt:

"Did you track them all?"

"Nope!" came Marty's reply. That was all that he offered, without further explanation as to why they didn't track all four of the rattlesnakes on their roster for the night. In the estimation of this author, they had been given ample time to do so.

Figure 1. Pregnant Black-tailed Rattlesnake (*Crotalus molossus*) number 24 (Cm24) as first found by John Slone, 28 June 2014. In situ image by Marty Feldner.

"Nope? An information highway you ain't, Marty! Would you care to elaborate on that just a little bit?"

"We got two."

"Two? Only two? What were you slackers doing up there, necking?"

"Shut up, Repp!" Slone rebutted, while entering the discussion unbidden. "We got distracted."

"You got distracted? Were you guys molesting the cattle again?"

"No, you *jerk*! How about I *slug you*," came Slone's retort. "We were distracted by the pregnant female *molossus* that I found for you."

"Oh! So there's that! Why didn't tell me that right from the start? We could have shaved a bunch of words from this future column of mine if you had."

"What future column?"

"The one that will appear in the *Bulletin of the Chicago Herpetological Society* exactly two years from now," I replied. "How do you know she's pregnant?"

Without further discourse, Slone dug into his backpack and hauled a lively and hefty sack out. We untied the knot, and all proceeded to shine and gaze lovingly at the very plump, sweet young Black-tailed Rattlesnake (*Crotalus molossus*) nestled in the depths of the cottony soft confides. Her short and narrow tail indicated that this was indeed a female. She was a fat one all right, and in an instant, the decision that she was indeed pregnant was unanimous. We had a few new transmitters to burn, and had predetermined that *any* new female *molossus* that came our way would receive one. And this one was a dandy! New snakes always slow the process of radio-tracking down mightily, as one must do everything required data-wise for a tracked snake, with the added complications of a capture thrown into the works. My crack(ed) crew subsequently received the glowing praise that was their due, (one must always praise any free help from one's herp buddies—no matter how bad a taste it leaves in one's mouth), and we pulled the plug for the night and went home.

At the time, Mr. Wideawake here always kept two large, opaque plastic sweater boxes pre-cleaned and sterilized for any new arrivals to the study. Said sweater boxes were the perfect container for mid-sized rattlesnakes. Each was lined on the bottom with newspaper, and contained a hide box, shedding rock and empty water bowl. Just add water and snake, and everything was set until surgery time. Just prior to removing *Crotalus molossus* #24 (Cm24) from her sack, I obtained a mass on the whole package. Cm24 was next carefully poured out of her restraining 90%-cotton temporary prison into the container. Her reaction to this was the usual gathering into a defensive

posture, rattle singing, and head aimed upward to watch my every move. Once the lid was deftly slammed shut, the customary loud thump of a potential death-blow dented said lid slightly outward from below. Yehaw! I next took a mass on the empty bag. This was subtracted from the overall mass of the bagged snake, and we knew that our new girl arrived with a mass of 450 grams (just shy of 1 lb). These numbers were carefully noted on her capture data sheet by the scribe during the process, and the job was done. I placed the customary UL-approved escape-stopping bricks on the top of the container, and went to bed. (Nothing says "safe housing" of a highly venomous snake like bricks stacked on the lid of a sweater box).

As a courtesy to my beloved wife Dianna, who was peacefully sawing logs at the time, I gently gave her a shake, and informed her that a new, willing-to-kill venomous arrival was now occupying the real estate next to her sewing machine. She tried her best to conceal her enthusiasm with this news by muttering a few negative comments about it all, while pretending to immediately lapse back into a deep sleep. I always marvel at her ability to hide her rapture over such exciting events as this.

The following day, Marty and I jetted up to Tempe to visit Dr. Dale DeNardo, our esteemed surgeon. The intent was to get a transmitter inside our new girl, and get her back into the game as soon as possible, so that we could witness parturition in the wild. But as soon as Dale saw our new acquisition, he shook his head and emphatically announced: "If I cut into her, kids will come spewing out on the table. Bring her back when she has dropped." In other words, there was no room at the inn for an extra 11 grams in this sausage! While we had her out of the bag, it was noted that her ventral scales had kinked to form a jagged ridge of sorts in the center. The ridge extended roughly 50 cm along the length of the middle of the snake, consisting of little peaks rising roughly 1 mm above the center of each highly rounded vent scute. These little peaks were at oblique angles to each other, as if they were a small mountain range rising from her center. We paid no further mind to this phenomenon; she was bagged and eventually returned to her sweater box home. The waiting game began. The waiting game consisted of me checking her on a daily basis. A datasheet was prepared to document the birthing process.

While this was ensuing, my mind kept going back to that ventral center ridge on the snake. Finally, on 23 July, I called Marty over to the house so that we could get some images to document this ridge of hers. The notion was to get an image of her belly before and after parturition, in order to have a visual comparison of what the outcome of this ridge would be. While we get a bit ahead of ourselves with the event by doing so, I ask the reader to refer to Figure 2. The caption will explain the rest.

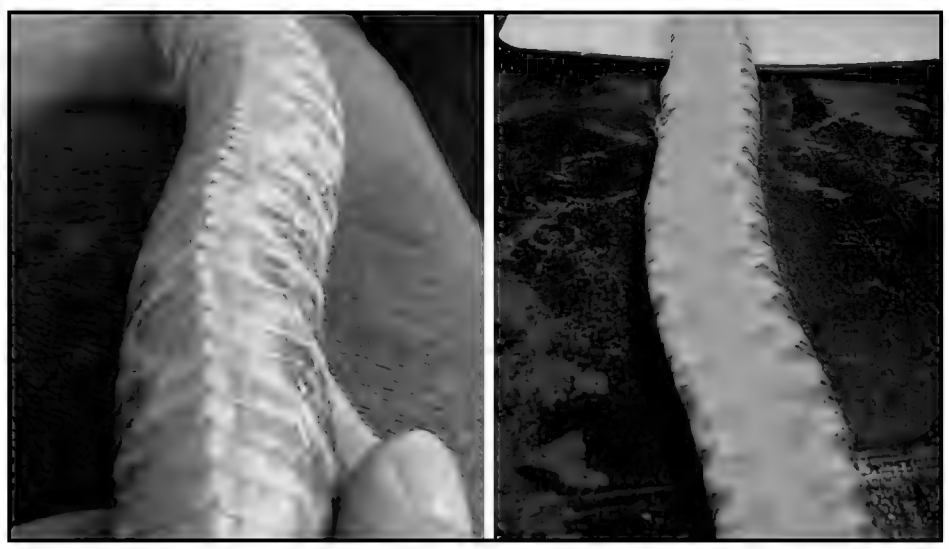

Figure 2. (Left) Ventral peaking prior to parturition on Cm24, 23 July 2014. The jagged keel earned Cm24 the name Godzilla. (Right) Same snake, ventral peaking has vanished post parturition, 14 August 2014.

Upon staring at the images of these ridges, my mind took me in the direction of the jagged armored plates running up the back of the famed movie monster Godzilla. It was at that point that Cm24 received the most unladylike name of "Godzilla." (Although the movie Godzilla 1998 revealed that the world's most famous dinosaur is, as they put it, asexual. He/she/it lays eggs in the bowels of a New York Subway, and his/her/its brood goes around mangling and eating every hapless soul that they encounter. It is well for Godzilla to have been in New York City instead of North Carolina. The poor asexual monster has no pockets to carry a birth certificate, hence, would have been denied the use of any public bathrooms).

I carefully hand-picked a list of the most experienced snake Jedis in the country from my massive email files, and shipped an image to them of these ventral peaks, asking if they had seen it before. Three solid responses came back. Dale DeNardo had seen it with pregnant pythons, Dave Barker had seen it with pregnant boids, and John Slone had observed it with pregnant rattlesnakes. In all cases, as suggested, it was associated with pregnancy, and in all cases the ridge disappeared after parturition. It is interesting to mention that only three people on the list came through with any knowledge of this phenomenon. Despite the fact that all the people on this list were lifetime aficionados of snakes, and highly knowledgeable of the most intricate details, the overwhelming response was "I've never seen this before." Perhaps this is because we often only look at a snake from the top, while the bottom remains hidden from view. One misguided expert went so far as to suggest that it was a sign of some sort of infectious disease, and the snake should be euthanized! (*That* wasn't going to happen!) The discussion next centered around the physiological reason that this ridging would occur. It does not seem to make sense. Having the physique of a pregnant woman myself, I find pinching my belly so there is a peak causes some discomfort, and actually reduces the area that contains the bulk. But the act also compacts and strengthens the

Figure 3. 25 July, 2014, Godzilla drops. Her cage was checked at 0700 hours that morning, there was nothing but a fat snake observed. By 1800 hours, this image reveals that at least six young have emerged from mamma.

Figure 4. (Left) 29 July 2014, Godzilla's neonates demonstrate their propensity for climbing by attaining the highest perch available. Note that mamma remains in the hide box. (Right) 25 August 2013, neonates in a wild situation display similar characteristics. Note that mamma is in the lower right corner of this image. Contrary to popular belief, nesting neonate rattlesnakes often leave their mother's side and natal site to explore the world nearby. Images by author (L) and Marty Feldner (R).

package surrounding it. My own conclusion is that this ridge is actually a stiffener of sorts that holds the package tightly in place. Whatever the reason, as Figure 2 demonstrates, the ridge vanished without a trace following the birthing process.

On the evening of 25 July, less than 48 hours following the photo session that documented the ventral ridge, Godzilla gave birth to eight healthy neonates. (Figure 3). Mamma dropped 169 grams in the process. The gender ratio of her wee ones was 5 males, 3 females. Observations occurred multiple times daily from that point on. I would sneak up with my camera, flip open the lid to the sweater box, and take some quick images of whatever was viewed at that moment in time. One aspect of the behavior of the youngsters was their tendency to go upwards in their cage. While a few could at times be found coiled inside the hide box with mamma, the majority of the time, they were on top of the hide box (Figure 4). In hopes of getting that one money shot of mamma with all eight of her kids, I eventually removed the hide box and set up a more natural looking arena. While I'm greatly disappointed with this effort, Figure 5 reveals that I was barely able to pull off catching Godzilla with all eight of her pups. The youngsters were quite the squirrely lot, and primarily used the new set up to go even higher in the cage. Flipping open the hinged plastic lid became quite an adventure. As many as three would be on the top rim of the enclosure, and they would always be ready to flop out onto the floor and make a beeline for freedom. I always had 50-cm-long forceps at ready when opening the cage.

The first of Godzilla's brood began the shedding process on 5 August, and the last one shed on 6 August—12 days after parturition. Each shed skin was collected as soon as it was noted, and stored in a miniature Ziploc bag. These in turn were stashed in a larger Ziploc that contained an index card on which

Figure 5. 6 August 2014, Godzilla with all eight of her youngsters. One of the neonates has used mamma as her shedding medium, despite many other suitable spots in the cage. Three out of the eight neonates used mamma in this fashion. What better way could possibly exist for a neonate rattlesnake to bond with its mother?

Figure 6. 6 August 2014, female neonate knocked out cold in author's hand. Shown for size perspective. On this evening, all eight neonates were anesthetized for processing. Note the primitive but effective anesthesia chamber in upper right corner of image.

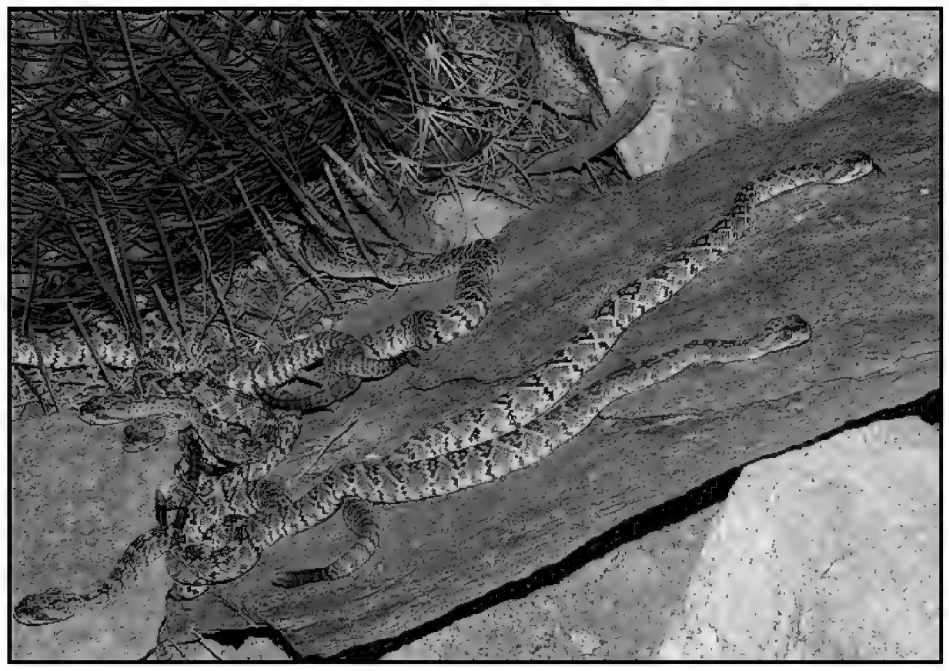

Figure 7.

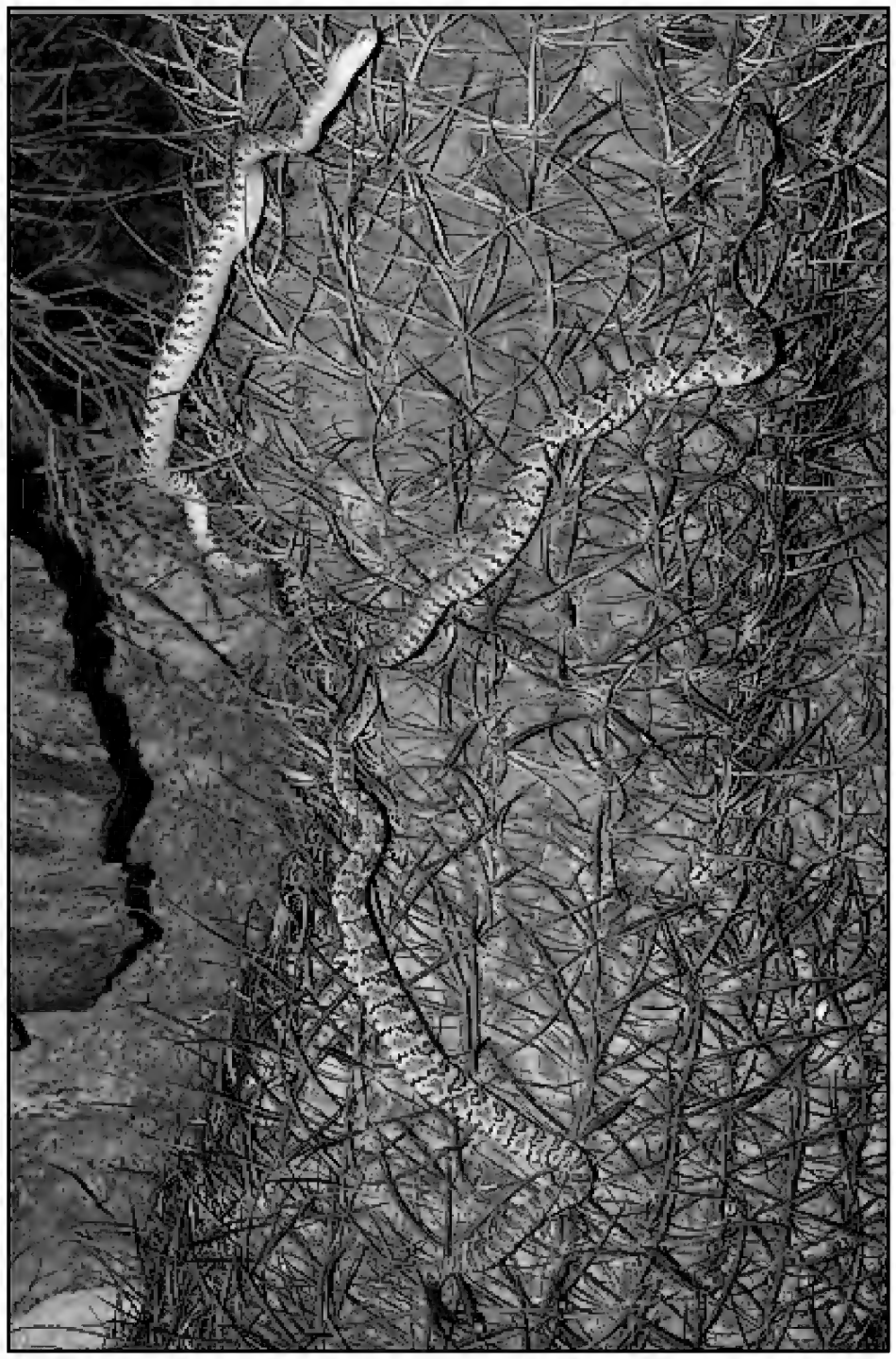

Figure 8.

Figure 9.

Figure 10.

Figure 11.

Freedom! These five images, taken by Marty Feldner on the evening of 9 August 2014, demonstrate what happened as soon as the youngsters were poured from a coffee can onto Godzilla's capture site. According to Marty, five of the eight climbed to the top of nearby barrel cacti. He focused on the grouping of three in this series of photos. Note that a primitive form of assisting a sibling occurs in the third image. There is some hesitation once they reach the top, as if they are thinking "Ok, *now* what do we do?" And then, it's "Let's go over here." And off they go!

Figure 12. 16 August 2014, Godzilla is released at her capture site. There is nothing that makes this author's heart swell with joy more than watching a wild snake returned home. Even though the Suizo Mountain Project concluded in January 2016, Godzilla's propensity to show fidelity to her hibernaculum sets up the potential of future observations.

the important information was inscribed. All this still remains in my refrigerator, in hopes that one fine day, their DNA will be extracted. When the last one shed, I spent the next six hours painstaking processing them. The short story on all that is they were all just over 30 cm in SVL, had tails roughly 20 mm long, and had a mass of around 25 grams. For a size perspective of the wee ones, see Figure 6.

Some of the participants of the Suizo Mountain Project have been blessed to witness parturition with rattlesnakes in the wild over thirty times. With each event, as soon as the young shed their skins, they leave both mamma and the nest site. In order to simulate this aspect of nesting, I removed the young, and delivered them to John Slone on 8 August. On the evening of 9 August, Marty released them all back at the capture site of Godzilla. While we didn't really know if this was to be her birthing site, our previous experience with *Crotalus molossus* had taught us that they usually settle in over a month early. The place had the gestalt of the perfect nest site.

I have many times over taken a bunch of neonate rattlesnakes to a nest site to put them back in the wild. On some occasions, I would have mamma with them. Each time I did this, I would frantically gather the young around mother, and try to do some nature-faking photography. It never worked. Each time, as soon the young hit the ground, they would wildly scatter across the landscape. Ten minutes after they were released, there was not a one that could be found again. Hence, when Marty announced that he would get some images of the release of Godzilla's brood, I gave him a quick horse laugh, and wished him luck. But as the images in Figures 7 through 11 indicate, Marty was indeed able to capture some very cool images. As soon as they hit the ground, they scattered, but five of the eight showed that they were still climbing fools, and jetted up some nearby barrel cacti. While we will likely never see any of them again, we still have their DNA with the skins that they left behind, not to mention some very careful photo documentation of each.

As for Godzilla, I had to wait for our world-traveling surgeon to return from one of his many out-of-country journeys before we could get a transmitter into her. (It is always a source of wonderment to me how academics who don't get paid enough money to even get out of sight still manage to travel around the world many times over each year. There is something fishy about all that, but I have no desire to bite the hands that help me). Godzilla went in for her surgery on 14 August, and was released back at her capture site the morning of 16 August. (Figure 12). She went on to perform above our expectations for the remainder of the study. As no doubt none of the readers of these columns will remember, (and if you do—get a life), she was the snake that struck and devoured a packrat while being observed and photographed by a gang of students from the UK. She further assisted this author in his endeavors to observe wild rattlesnakes by leading us to a marvelous stretch of canyon that harbors several other hibernating Black-tailed Rattlesnakes. I can expect to see her and/or her associates for as long as my legs can carry me up Tim Canyon. (Probably two years tops—it's a tough hike). But for now:

This here is Roger Repp, signing off from southern Arizona, where the turtles are strong, the snakes are handsome, and the lizards are all above average.

Advertisements

For sale: **highest quality frozen rodents**. I have been raising rodents for over 30 years and can supply you with the highest quality mice available in the U.S. These are always exceptionally clean and healthy with no urine odor or mixed in bedding. I feed these to my own reptile collection exclusively and so make sure they are the best available. All rodents are produced from my personal breeding colony and are fed exceptional high protein, low fat rodent diets; no dog food is ever used. Additionally, all mice are flash frozen and are separate in the bag, not frozen together. I also have ultra low shipping prices to most areas of the U.S. and can beat others shipping prices considerably. I specialize in the smaller mice sizes and currently have the following four sizes available: Small pink mice (1 day old—1 gm) , $25 /100; Large pink mice (4 to 5 days old—2 to 3 gm), $27.50 /100; Small fuzzy mice (7 to 8 days old—5 to 6 gm) , $30/100; Large fuzzy mice / hoppers (10 to 12 days old—8 to 10 gm), $35/100 Contact Kelly Haller at 785-234-3358 or by e-mail at kelhal56@hotmail.com

For sale: 25 large, heavy-duty, open-top white plastic tubs, most with installed drains, perfect for aquatic/semi-aquatic turtles, small lizards, etc. Segments of PVC drain pipe fitted to tubs can be included with purchase. Each tub is approximately 36 inches by 66 inches, and approximately 12 inches in depth. All are gently used and in great shape. Asking $75 each, $65 each for 2 or more. Pick-up only from Kenosha, Wisconsin, area. Contact Jim or Kirsten at (262) 331-3423.

For sale: Standard 24" Neodesha reptile cages, 3 × 6" vent on top, tempered glass front. Like new condition, no burns or stains, original glass. These cages do not have the dam (horizontal molding that crosses the entire front width of the cage, used to hold back bedding material)—easier to clean without the dam. About 20 currently available, $45 each. Linda Malawy, (630) 717-9955, linda_malawy@hotmail.com.

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UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, June 29, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. This will be our popular and always well-attended annual **Show & Tell** meeting. Bring an animal that you find interesting for one reason or another and be prepared to give a short (under five minutes) presentation to the group. Don't be shy. Neither age (yours) nor commonness (the animal's) should be a limitation.

The July 27 meeting will feature **Douglas R. Mader, D.V.M.** Dr. Mader, co-owner of the Marathon Veterinary Hospital in the Florida Keys, will speak about "Iguanas in the Florida Keys." The green iguana (*Iguana iguana*) has been one of the most popular reptile pets ever in the United States—except for the Florida Keys. Green iguanas are common in the tropical island chain and are considered pests by locals. So much so that there is a bounty on the reptiles and an "open season" on them. It is legal to shoot and kill iguanas providing that they are killed with a single shot. This talk will discuss the ecological impact of the popular pet, the origin of the problem and possible solutions.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

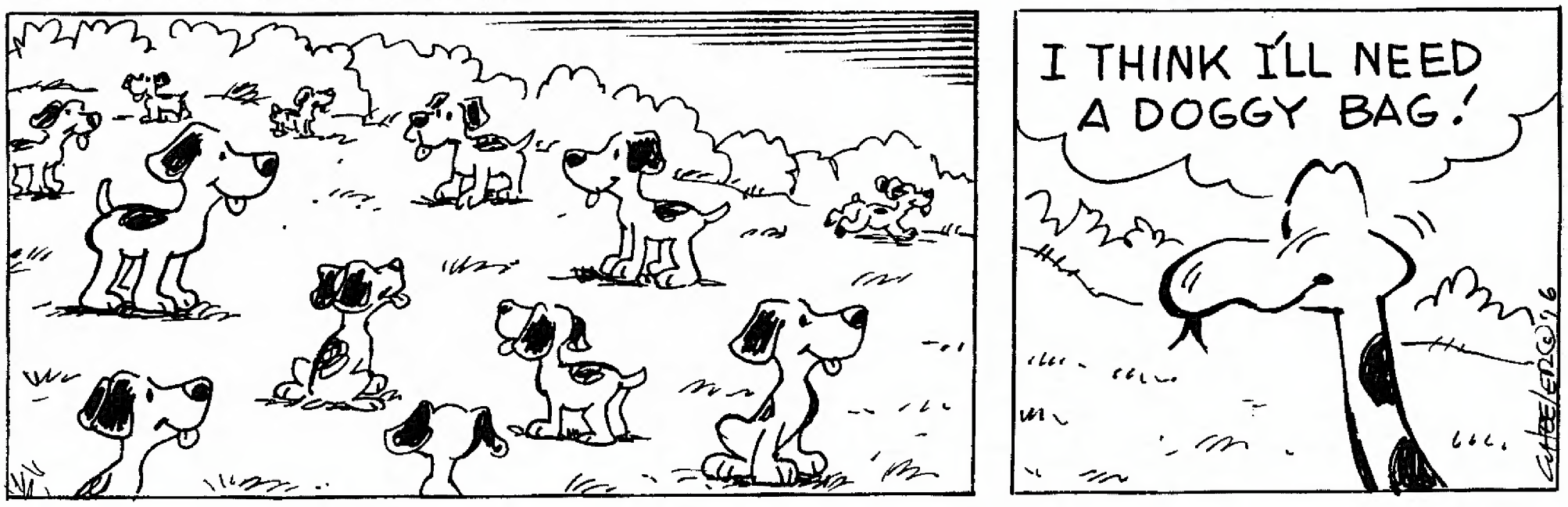
Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the next board meeting, to be held at 7:30 P.M., Friday, July 15, 2016, at the Schaumburg Township District Library, 130 S. Roselle Road, Schaumburg.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the group's Facebook page.

THE ADVENTURES OF SPOT



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